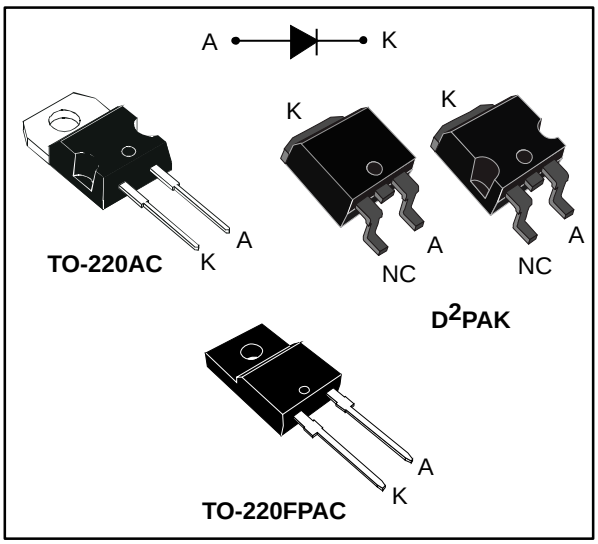
STPS745

Power Schottky rectifier

Datasheet - production data



Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAC
  - Insulating voltage = 2000 V_{RMS} sine
- Avalanche capability specified
- ECOPACK®2 compliant component for D²PAK on demand

Description

Single Schottky rectifier suited for Switch Mode Power Supply and high frequency DC to DC converters.

Packaged either in TO-220AC, TO-220FPAC or D²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	7.5 A
V_{RRM}	45 V
T_j (max)	175 °C
V_F (typ)	0.5 V

1 Characteristics

Table 2: Absolute ratings (limiting values, at 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			45	V
$I_{F(RMS)}$	Forward rms current			20	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220AC / D^2PAK	T_C = 160 °C	7.5	A
		TO-220FPAC	T_C = 145 °C		
I_{FSM}	Surge non repetitive forward current	tp = 10 ms sinusoidal		150	A
P_{ARM}	Repetitive peak avalanche power	tp = 10 µs, T_j= 125 °C		190	W
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature (1)			+ 175	°C

Notes:

(1)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal parameter

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / D^2PAK	3.0	°C/W
		TO-220FPAC	5.5	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		100	µA
		T_j = 125 °C		-	5	15	mA
V_F (1)	Forward voltage drop	T_j = 125 °C	I_F = 7.5 A	-	0.5	0.57	V
		T_j = 25 °C	I_F = 15 A	-		0.84	
		T_j = 125 °C	I_F = 15 A	-	0.65	0.72	

Notes:

(1)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.42 \times I_{F(AV)} + 0.020\ I_F{}^2{}_{(RMS)}$

1.1 Characteristics (curves)

Figure 1: Average forward power dissipation versus average forward current

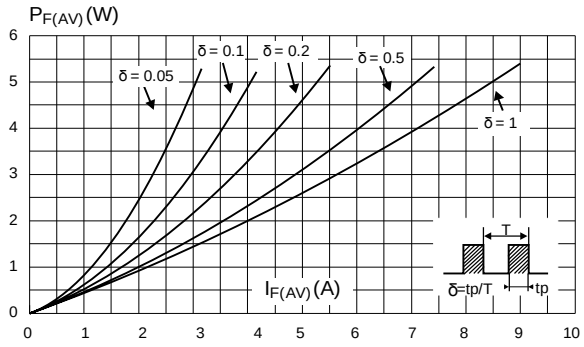


Figure 2: Average forward current versus ambient temperature (δ= 0.5)

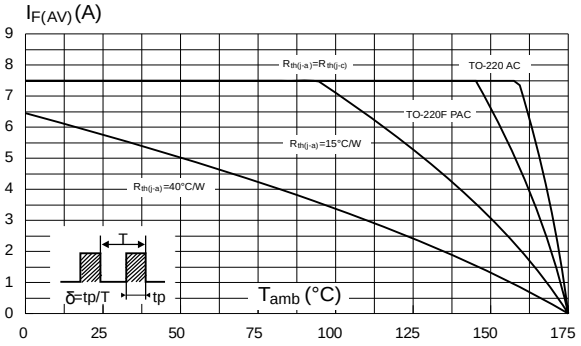


Figure 3: Normalized avalanche power derating versus pulse duration (Tj= 125 °C)

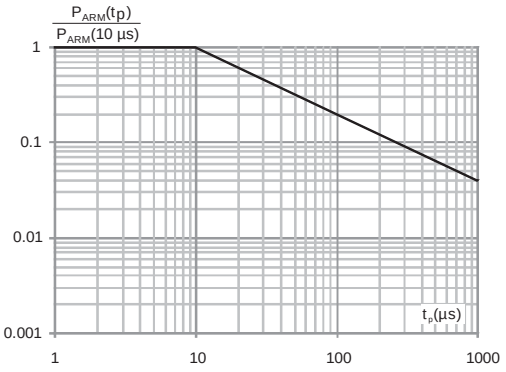


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC and D²PAK)

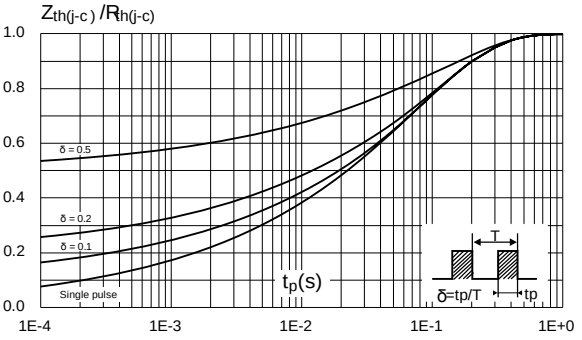


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

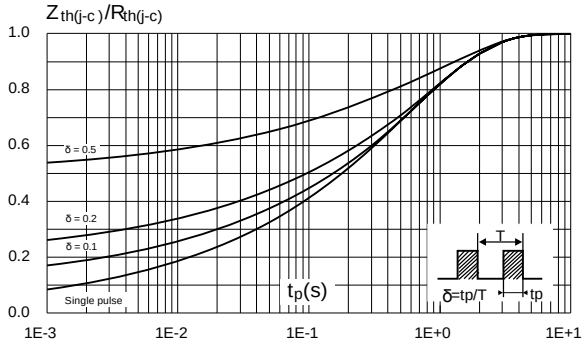


Figure 6: Reverse leakage current versus reverse voltage applied (typical values)

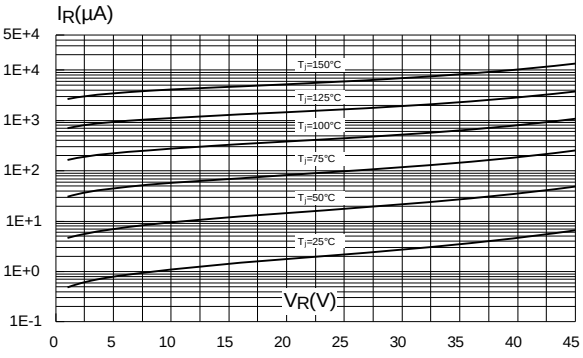


Figure 7: Junction capacitance versus reverse voltage applied (typical values)

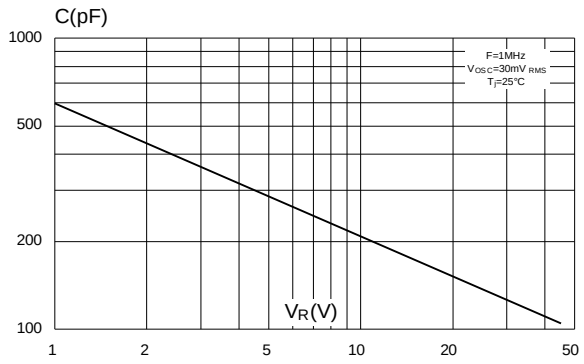


Figure 8: Forward voltage drop versus forward current (maximum values)

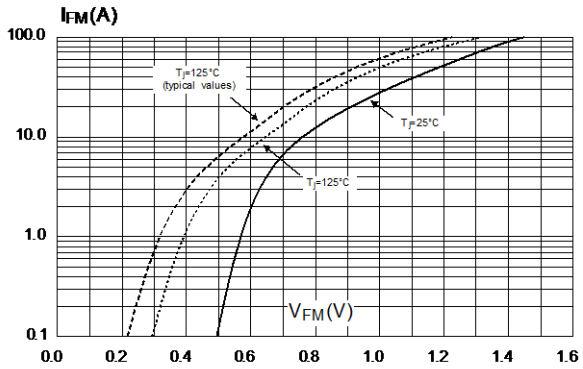
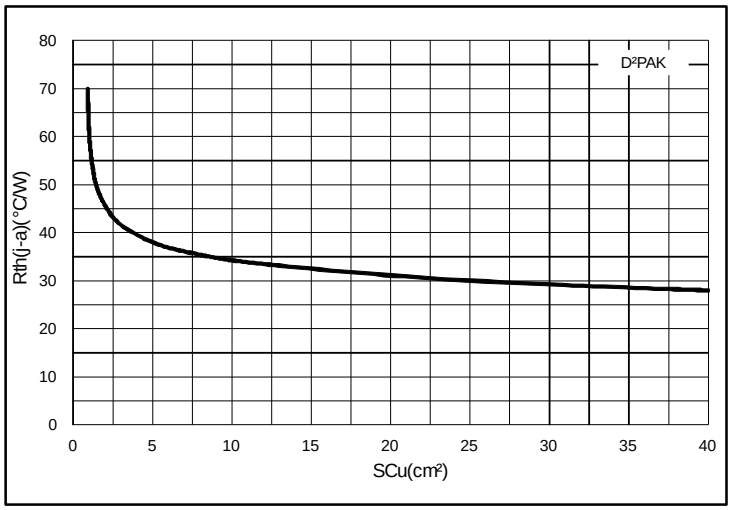


Figure 9: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed board FR4, eCu: 35 µm)



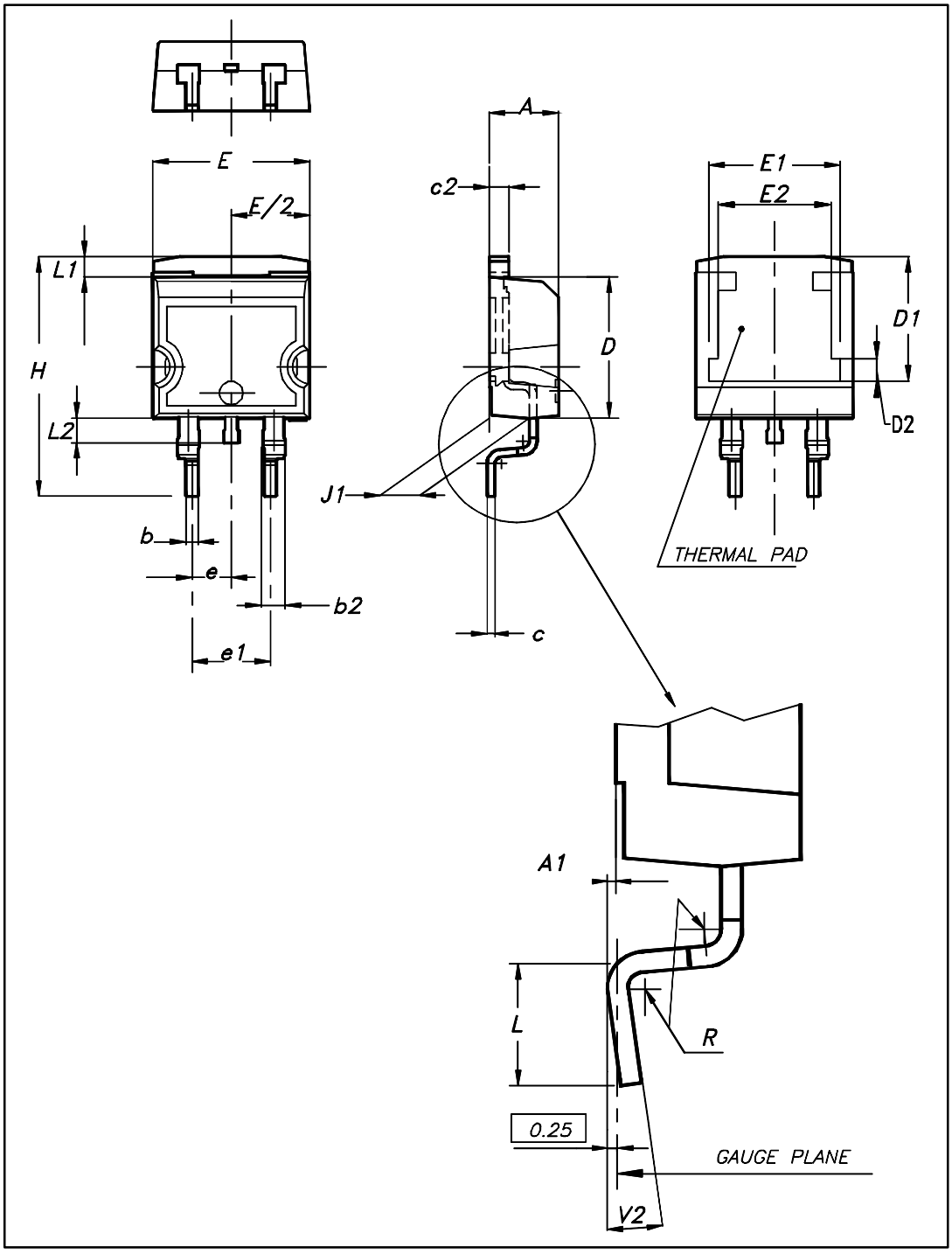
2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 Nm (for TO-220AC and TO-220FPAC)
- Maximum torque value: 0.70 Nm (for TO-220AC and TO-220FPAC)

2.1 D²PAK package information

Figure 10: D²PAK package outline

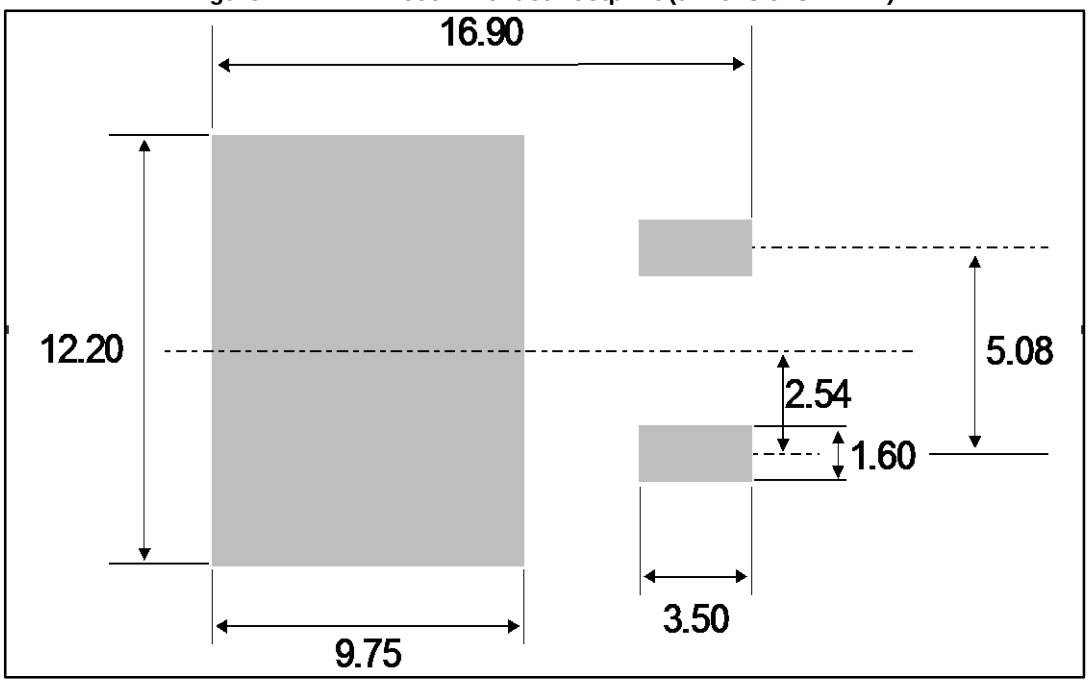


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5: D²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

Figure 11: D²PAK recommended footprint (dimensions in mm)



2.2 TO-220AC package information

Figure 12: TO-220AC package outline

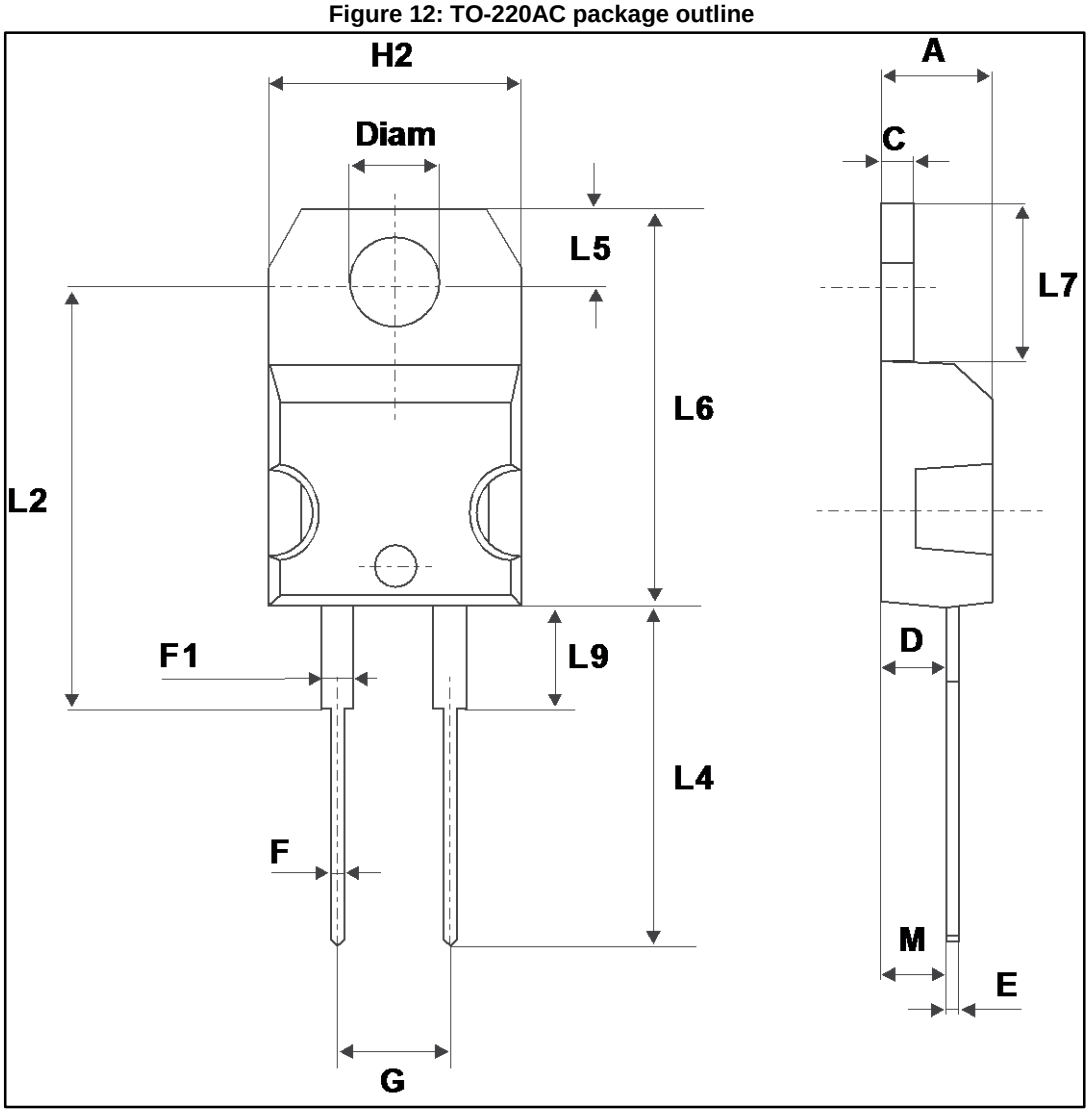


Table 6: TO-220AC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam	3.75	3.85	0.147	0.151

2.3 TO-220FPAC package information

Figure 13: TO-220FPAC package outline

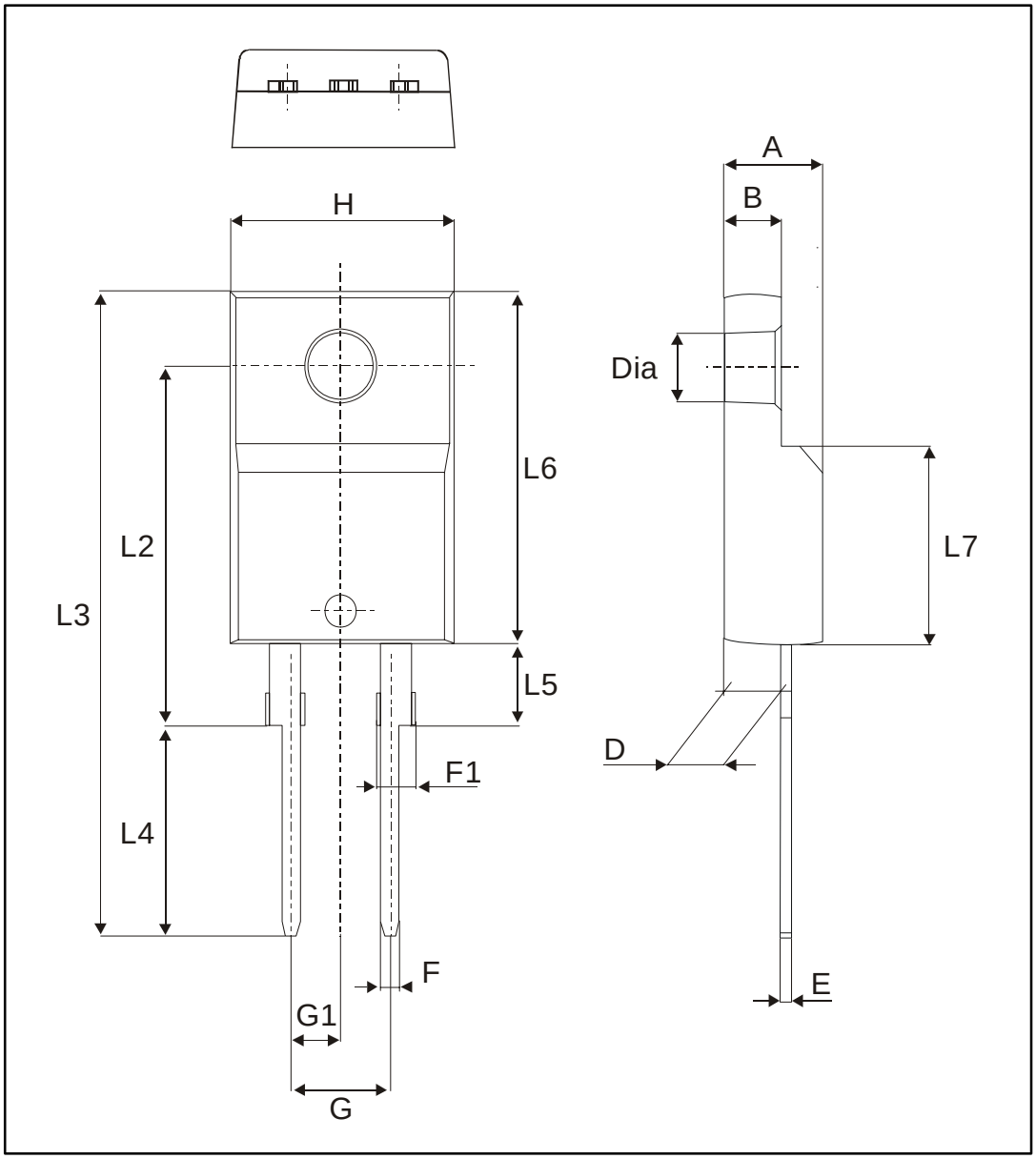


Table 7: TO-220AC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 typ.		0.63 typ.	
L3	28.6	30.6	0.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS745D	STPS745D	TO-220AC	1.86g	50	Tube
STPS745G-TR	STPS745G	D^2PAK	1.38g	1000	Tape and reel
STPS745FP	STPS745FP	TO-220FPAC	1.9g	50	Tube

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
Jul-2003	6	Last release
22-Mar-2007	7	Removed ISOWATT package.
29-May-2015	8	Updated features, packages silhouette and *Table 1: "Device summary"* in cover page. Updated *Table 2: "Absolute ratings (limiting values, at 25 °C, unless otherwise specified)"* and *Section 1.1: "Characteristics (curves)"*. Minor text changes.

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